AMENDMENTS TO THE CLAIMS

Please amend the claims as follows. Please add new claims 20-29.

1. (Previously Presented) A vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle, comprising:

a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a feedback loop of an output of at least one node, and outputting a vehicle parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model;

plural second recurrent neural networks, each of said second recurrent neural networks formed by connecting second plural nodes such that a second output of a second node is input to another second node in accordance with a second predetermined coupling weight coefficient, comprising a second feedback loop of a second output of at least one second node, and outputting a second vehicle parameter different from said vehicle parameter output from said first recurrent neural network and indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model; and

an optimizing unit for determining an optimum solution of said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plural second recurrent neural networks based on a learning rule using a hereditary algorithm,

wherein said first recurrent neural network and said plural second recurrent neural networks are mutually connected to each other such that a state variable including a correlation with said vehicle parameter output from said first recurrent neural network is input to each of said plural second recurrent neural networks.

2. (Previously Presented) The vehicle motion model generating device according to claim 1, wherein said state value represents one of a road surface state and a motion state of the vehicle.

3. (Previously Presented) The vehicle motion model generating device according to claim 1, wherein said predetermined input information comprises at least one of a steering angle, a steering angular velocity, a steering angular acceleration, a steering reaction force, a vehicle speed, and a vehicle acceleration, and

wherein said vehicle parameter comprises at least three of an estimation value of a yaw rate, an estimation value of lateral acceleration, an estimation value of roll, and an estimation value pitch .

4. (Previously Presented) The vehicle motion model generating device according to claim 1, wherein said first recurrent neural network outputs an estimation value of a yaw rate as said vehicle parameter .

Claims 5-10 (Canceled.)

11. (Previously Presented) A road surface friction coefficient estimating device for estimating a road surface friction coefficient based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device, wherein said vehicle motion model generating device comprises:

a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a feedback loop of an output of at least one node, and outputting a vehicle parameter indicating said motion state of the vehicle of based on a predetermined input information, thereby functioning as said vehicle motion model;

plural second recurrent neural networks, each of said second recurrent neural networks formed by connecting second plural nodes such that a second output of a second node is input to another second node in accordance with a second predetermined coupling weight coefficient, comprising a second feedback loop of a second output of at least one second node, and outputting a second vehicle parameter different from said vehicle parameter output from said first recurrent neural network and indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model; and

an optimizing unit for determining an optimum solution of said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plural second recurrent neural networks based on a learning rule using a hereditary algorithm,

wherein said first recurrent neural network and said plural second recurrent neural networks are mutually connected to each other such that a state variable including a

correlation with said vehicle parameter output from said first recurrent neural network is input to each of said plural second recurrent neural networks .

12. (Previously Presented) A vehicle behavior estimating device for estimating a behavior of a vehicle based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device, wherein said vehicle motion model generating device comprises:

a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a feedback loop of an output of at least one node, and outputting a vehicle parameter indicating of said motion state of the vehicle based on the predetermined input information, thereby functioning as said the vehicle motion model;

plural second recurrent neural networks, each of said second recurrent neural networks are formed by connecting second plural nodes to another second node in accordance with a second predetermined coupling weight coefficient, comprising a second feedback loop of a second output of at least one second node, and outputting a second vehicle parameter different from said vehicle parameter output from said first recurrent neural network and indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model; and

an optimizing unit for determining an optimum solution of said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plural second recurrent neural networks based on a learning rule using a hereditary algorithm,

wherein said first recurrent neural network and said plural second recurrent neural networks are mutually connected to each other such that a state variable including a correlation with said vehicle parameter output from said first recurrent neural network is input to each of said plural second recurrent neural networks .

13. (Previously Presented) A method for generating a vehicle motion model that represents a motion state of a vehicle, wherein a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient and includes a feedback loop of an output of at least one node, and plural second recurrent neural networks each formed by connecting the second plural nodes such that a second output of a second node is input to another second node in accordance with a second predetermined coupling wake coefficient and includes a second feedback loop of a second output of at least one second node, said method being executed by a computer, and said method comprising:

determining an optimum solution of a genetic type based on a learning rule using a hereditary algorithm while setting said predetermined coupling weight coefficient of said first recurrent neural network and said second predetermined coupling weight coefficient of said plurality of second recurrent neural networks as said genetic type;

outputting an optimum solution of said predetermined coupling weight coefficient to said first recurrent neural network based on said optimum solution of said genetic type;

outputting a second optimum solution of said second predetermined coupling weight coefficient to said plurality of second recurrent neural networks based on said optimum solution of said genetic type;

outputting a first vehicle parameter from said first recurrent neural network indicating said motion state of the vehicle based on predetermined input information, and outputting at least one second vehicle parameter from said plurality of second recurrent neural networks indicating said motion state of the vehicle based on said predetermined input information, thereby functioning as said vehicle motion model; and

outputting a state variable from said first recurrent neural network to each of said plural second recurrent neural networks, said state variable including a correlation with said first vehicle parameter.

14. (Previously Presented) The method according to claim 13, wherein said state value represents one of a road surface state and a motion state of the vehicle.

15. (Previously Presented) The method according to claim 13, wherein said predetermined input information comprises at least one of a steering angle, a steering angular velocity, a steering angular acceleration, a steering reaction force, a vehicle speed, and a vehicle acceleration, and

wherein said second vehicle parameters comprise at least three of an estimation value of a yaw rate, an estimation value of lateral acceleration, an estimation value of roll, and an estimation value pitch.

16. (Previously Presented) The method according to claim 13, comprising:

outputting an estimation value of a yaw rate as said first vehicle parameter by said first recurrent neural network.

Claims 17-19 (Canceled.)

20. (New) The vehicle motion model generating device according to claim 1, wherein said plural second recurrent neural networks comprise at least two recurrent neural networks that each receive said state variable from said first recurrent neural network.

21. (New) The road surface friction coefficient estimating device according to claim 11, wherein said plural second recurrent neural networks comprise at least two recurrent neural networks that each receive said state variable from said first recurrent neural network.

22. (New) The vehicle behavior estimating device according to claim 12, wherein said plural second recurrent neural networks comprise at least two recurrent neural networks that each receive said state variable from said first recurrent neural network.

23. (New) The method according to claim 13, wherein said plural second recurrent neural networks comprise at least two recurrent neural networks that each receive said state variable from said first recurrent neural network.

24. (New) The vehicle motion model generating device according to claim 1, wherein said predetermined coupling weight coefficient is output from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural

networks.

25. (New) The road surface friction coefficient estimating device according to claim 11, wherein said predetermined coupling weight coefficient is output from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural networks.

26. (New) The vehicle behavior estimating device according to claim 12, wherein said predetermined coupling weight coefficient is output from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural networks.

27. (New) The vehicle motion model generating device according to claim 1, wherein a threshold value is output from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural networks.

28. (New) The vehicle motion model generating device according to claim 11, wherein a threshold value is output from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural networks.

29. (New) The method according to claim 13, further comprising:

outputting a threshold value is from said optimizing unit to said first recurrent neural network and each of said plurality of second recurrent neural networks.